

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference PH/HM/8101INT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA416)	
International application No. PCT/GB 02/01878	International filing date (day/month/year) 26.04.2002	Priority date (day/month/year) 26.04.2002
International Patent Classification (IPC) or both national classification and IPC G06F3/023		
Applicant NOKIA CORPORATION et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 11 sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 19.11.2003	Date of completion of this report 01.09.2004
Name and mailing address of the International preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Davenport, K Telephone No. +31 70 340-2191

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB 02/01878

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*):

Description, Pages

1, 4-10 as originally filed
2, 2a, 3 received on 29.07.2004 with letter of 28.07.2004

Claims, Numbers

1-43 received on 29.07.2004 with letter of 28.07.2004

Drawings, Sheets

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 02/01878

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
- (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

see separate sheet

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-43
	No: Claims	
Inventive step (IS)	Yes: Claims	24-43
	No: Claims	1-23
Industrial applicability (IA)	Yes: Claims	1-43
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 02/01878

Re Item I**Basis of the report**

Claim 1 has been amended to state that "each of the control signals of the second set is associated with an adjacent pair of sensors in the array, but each adjacent pair of sensors is not associated with a control signal of the second set." This is not only self-contradictory, but also introduces subject matter not present in the application documents as filed. A similar objection applies to corresponding amended independent method claim 23, mutatis mutandis.

The applicant has made no effort to provide bases for the amendments, in the originally filed application documents.

Therefore the claims examined are those originally filed.

The amendments to the description have been made to reflect the changes in the claimed subject matter and consequently introduce matter not originally present.

Re Item V**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following documents:

D1: ANONYMOUS: 'Keyboard Cursor Control Layout' IBM TECHNICAL DISCLOSURE BULLETIN, vol. 26, no. 4, 1 September 1983 (1983-09-01), pages 1967-1968, XP002226449 New York, US

- 1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-23 does not involve an inventive step in the sense of Article 33(3) PCT.
 - 1.1 With regard to claim 1, the document D1 is regarded as being the closest prior art and discloses a user input device (fig.1) comprising a plurality of sensors (fig.1, keys 1,2,3,4) for tactile actuation (depressing of a key) by a user including a first sensor (key 1) and a second sensor (key 2) adjacent thereto; control means responsive to the actuation of the first sensor by itself to produce a first control signal (paragraph 2, lines 3,4) responsive to the

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 02/01878

actuation of the second sensor by itself to produce a second control signal different from the first control signal (it is clear that pressing key 2 would result in a different cursor movement to key 1), and responsive to the simultaneous action of the first and second sensors in combination (paragraph 2, lines 4,5 - "If the two top keys 1 and 2 are pressed together) to produce a third control signal different from the first and second control signals (paragraph 2, lines 5,6 - "a vertical motion will result.").

The subject-matter of claim 1 therefore differs from the prior art in that the input device incorporated into a hand portable device.

Since it is well known for hand portable devices to require the use of a cursor control system, the use of such a system in said hand portable device cannot be considered as involving an inventive step (Article 33(3) PCT).

- 1.2 The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent method claim 23, which therefore is also considered not inventive.
- 1.3 The dependent claims 2-22 do not appear to contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step. See document D1.
- 2 With regard to claim 24, document D1 discloses a user input device for providing 8-way directional control (fig.1) comprising a first set of sensors consisting of a first sensor adjacent a second sensor, constituting a first pair of sensors (fig.1, keys 1 and 2), and a third sensor adjacent the second sensor, constituting a second pair of sensors (keys 2,3); a fourth sensor (key 4), a third pair of sensors (keys 3 and 4) and a fourth pair of sensors (keys 4 and 1); wherein user actuation of a respective one of at least four sensors provides for control in a respective one of four different directions (paragraph 2, lines 3,4 - "If key 1 alone... ..will occur.") and user actuation of a respective one of the first, second, third and fourth pairs of sensors provides for control in a respective one of the remaining four different directions (paragraph 2, lines 4-6 - "If the top... ..will result.").

The subject-matter of claim 24 therefore differs from the prior art in that there are two extra sensors, with a fifth sensor adjacent to fourth and constituting therewith a third pair of sensors, and a sixth sensor adjacent to the fifth sensor and

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 02/01878

constituting therewith a fourth pair of sensors, said first and second pairs of sensors constituting a first set of sensors, and said third and fourth pairs of sensors constituting a second set of sensors.

The subject matter of claim 24 is therefore novel.

The problem to be solved may therefore be regarded as providing an alternative solution to achieving 8-way directional control using a set of mutually adjacent sensors, the number of sensors being less than the number of directions.

Thus the solution to this problem proposed in claim 24 of the present application is considered as involving an inventive step (Article 33(3) PCT) because the skilled person, in seeking to reduce the number of sensors, would not be prompted to use a six sensor system, as is disclosed in the application, because a system is already known which uses only four sensors.

- 3 The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claim 43, which therefore is also considered novel and inventive.

Because claims 25-42 depend on claim 24, they also meet the requirements of the PCT with regard to novelty and inventive step.

EPO - DG 1

03.08.2004

11

CLAIMS

(94)

1. A hand portable device comprising:
a user input device comprising a plurality of sensors in an array for tactile actuation by a user;
control means responsive to the actuation of a sensor by itself or the simultaneous actuation of a pair of adjacent sensors;
wherein the control means produces one of N control signals upon actuation of a sensor by itself or the simultaneous actuation of an adjacent pair of sensors; and
wherein each of the N control signals belong to a first set of control signals or a second set of control signals, wherein each sensor of the array is associated with only one of the control signals of the first set and wherein each of the control signals of the second set is associated with an adjacent pair of sensors in the array, but each adjacent pair of sensors is not associated with a control signal of the second set.
2. A hand portable device as claimed in claim 1, wherein the plurality of sensors comprises a first set of sensors consisting of a first sensor adjacent a second sensor, constituting a first pair of sensors, and a third sensor adjacent the second sensor, constituting a second pair of sensors; and a second set of sensors consisting of a fourth sensor adjacent a fifth sensor, constituting a third pair of sensors, and a sixth sensor adjacent the fifth sensor, constituting a fourth pair of sensors.
3. A hand portable device as claimed in claim 2 wherein the pairs of sensors are located and arranged to be simultaneously actuated by a user using one digit.
4. A hand portable device as claimed in claim 2 or 3 wherein the first set of sensors is adjacent the second set of sensors.
5. A hand portable device as claimed in 2, 3 or 4, wherein the control means is responsive to user actuation of a respective one of at least four of the six

sensors to provide a respective one of four different control signals and is responsive to user actuation of a respective one of the first, second, third and fourth pairs of sensors to provides for a respective one of an additional four different control signals.

6. A hand portable device as claimed in any preceding claim, wherein the control means produces:

- (a) a first control signal in response to the actuation of a second sensor;
- (b) a second control signal in response to the actuation of a first sensor;
- (c) a third control signal in response to actuation of both the first and second sensors simultaneously;
- (d) a fourth control signal in response to the actuation of a third sensor;
- (e) a fifth control signal in response to the actuation of both the second and third sensors simultaneously;
- (f) a sixth control signal in response to the actuation of a fifth sensor;
- (g) a seventh control signal in response to the actuation of both the fifth and sixth sensors simultaneously; and
- (h) an eighth control signal in response to the actuation of both the fourth and fifth sensors simultaneously.

7. A hand portable device as claimed in claim 6 wherein the control means in response to the actuation of only the fourth sensor produces the second control signal and in response to actuation of only the sixth sensor produces the fourth control signal.

8. A hand portable device as claimed in any preceding claim wherein the control means comprises detection means for detecting the simultaneous actuation of keys.

9. A hand portable device as claimed in any preceding claim wherein the plurality of sensors is a 2x3 or 3x2 array of sensors.

13

10. A hand portable device as claimed in any preceding claim when dependent upon claim 2 wherein the user input device is a keypad having first, second, third, fourth, fifth and sixth keys which respectively actuate the first, second, third, fourth, fifth and sixth sensors whereby the first, second, third and fourth pairs of sensors have corresponding first, second, third and fourth pairs of keys.

11. A hand portable device as claimed in claim 10 wherein each pair of keys are located and arranged to be simultaneously actuated by a user using one digit.

12. A hand portable device as claimed in claim 10 or 11 wherein the pairs of keys are located and arranged to be actuated by a user rolling or pivoting one digit.

13. A hand portable device as claimed in any one of claims 10 to 12, wherein the first, second and third keys are arranged curvilinearly.

14. A hand portable device as claimed in any one of claims 10 to 12, wherein the first, second and third keys are arranged rectilinearly.

15. A hand portable device as claimed in any one of claims 10 to 14 wherein the fourth, fifth and sixth keys are arranged substantially parallel to the first, second and third keys.

16. A hand portable device as claimed in any one of claims 10 to 15, wherein the first, second, third, fourth, fifth and sixth keys form an array.

17. A hand portable device as claimed in any preceding claim wherein the first, second, third, fourth, fifth and sixth keys occupy an area not significantly exceeding 20 mm by 15 mm.

18. A hand portable device as claimed in any one of claims 10 to 17 wherein the keypad comprises a 4x3 array of mobile telephone keys.

19. A hand portable device as claimed in any one of claims 10 to 17 wherein the keypad is a typist's keypad.

20. A hand portable device as claimed in any one of claims 10 to 19 having a data entry mode where the keypad including the plurality of keys are used to enter data wherein in said data entry mode the control means is responsive to the actuation of the first key and second key separately but not together to produce different control signals.

21. A hand portable device as claimed in any preceding claim further comprising a display for displaying an image including an element moving in the display, wherein the first control signal causes the element to move in a first direction, the second control signal causes the element to move in a second direction and the third control signal causes the element to move in a third direction intermediate of the first and second directions.

22. A hand portable device as claimed in any one of claims 1 to 20 further comprising a display for displaying an image having a perspective dependent upon a notional viewing position, wherein the first control signal causes the notional viewing position to move in a first direction, the second control signal causes the notional viewing position to move in a second direction and the third control signal causes the notional viewing position to move in a third direction intermediate of the first and second directions.

23. A method of providing N-way directional control using more than $N/2$ but less than N sensors to provide N different control signals, wherein each of the N different control signals is a member of either a first set of control signals or a second different set of control signals, the method comprising:

associating each one of the sensors in the array with only one control signal from the first set;

associating each of the control signals of the second set with a pair of sensors without associating each of the pairs of sensors with a control signal of the second set;

detecting when a sensor or sensors of the array are actuated; and
providing the control signal associated with the detected actuated sensor(s).

24. A user input device for providing 8-way directional control, comprising a first set of sensors consisting of a first sensor adjacent a second sensor, constituting a first pair of sensors, and a third sensor adjacent the second sensor, constituting a second pair of sensors; and a second set of sensors, adjacent the first set of sensors, consisting of a fourth sensor adjacent a fifth sensor, constituting a third pair of sensors, and a sixth sensor adjacent the fifth sensor, constituting a fourth pair of sensors;

wherein

user actuation of a respective one of at least four of the six sensors provides for control in a respective one of four different directions and

user actuation of a respective one of the first, second, third and fourth pairs of sensors provides for control in a respective one of the remaining four different directions.

25. A user input device as claimed in claim 24, wherein the pairs of sensors are located and arranged to be simultaneously actuated by a user using one digit.

26. A user input device as claimed in claim 24 or 25, wherein the plurality of sensors is a 2x3 or 3x2 array of sensors.

27. A user input device as claimed in claim 24, 25 or 26, comprising a keypad having first, second, third, fourth, fifth and sixth keys which respectively actuate the first, second, third, fourth, fifth and sixth sensors whereby the first, second, third and fourth pairs of sensors have corresponding first, second, third and fourth pairs of keys.

28. A user input device as claimed in claim 27 wherein each pair of keys are located and arranged to be simultaneously actuated by a user using one digit.

29. A user input device as claimed in claim 27 or 28 wherein the pairs of keys are located and arranged to be actuated by a user rolling or pivoting one digit.

30. A user input device as claimed hand portable device as claimed in any one of claims 27 to 29, wherein the first, second and third keys are arranged curvilinearly.
31. A user input device as claimed in any one of claims 27 to 29, wherein the first, second and third keys are arranged rectilinearly.
32. A user input device as claimed in any one of claims 27 to 31 wherein the fourth, fifth and sixth keys are arranged substantially parallel to the first, second and third keys.
33. A user input device as claimed in any one of claims 27 to 29, wherein the first, second, third, fourth, fifth and sixth keys form an array.
34. A user input device as claimed in any one of claims 27 to 33, wherein the first, second, third, fourth, fifth and sixth keys occupy an area not significantly exceeding 20 mm by 15 mm.
35. A user input device as claimed in any one of claims 27 to 34 wherein the keypad comprises a 4x3 array of mobile telephone keys.
36. A user input device as claimed in any one of claims 27 to 34, wherein the keypad is a typist's keypad.
37. A hand portable device comprising a user input device as claimed in any one of claims 24 to 36, and control means, wherein the control means produces:
- (a) a first control signal in response to the actuation of the second sensor;
 - (b) a second control signal in response to the actuation of the first sensor;
 - (c) a third control signal in response to actuation of both the first and second sensors simultaneously;
 - (d) a fourth control signal in response to the actuation of the third sensor;
 - (e) a fifth control signal in response to the actuation of both the

second and third sensors simultaneously;

- (f) a sixth control signal in response to the actuation of the fifth sensor;
- (g) a seventh control signal in response to the actuation of both the fifth and sixth sensors simultaneously; and
- (h) an eighth control signal in response to the actuation of both the fourth and fifth sensors simultaneously.

38. A hand portable device as claimed in claim 37 wherein the control means in response to the actuation of only the fourth sensor produces the second control signal and in response to actuation of only the sixth sensor produces the fourth control signal.

39. A hand portable device as claimed in claim 37 or 38, wherein the control means comprises detection means for detecting the simultaneous actuation of keys.

40. A hand portable device as claimed in any one of claims 37 to 39 having a data entry mode where the keypad including the plurality of keys are used to enter data wherein in said data entry mode the control means is responsive to the actuation of the first key and second key separately but not together to produce different control signals.

41. A hand portable device as claimed in any one of claims 37 to 40 further comprising a display for displaying an image including an element moving in the display, wherein the first control signal causes the element to move in a first direction, the second control signal causes the element to move in a second direction and the third control signal causes the element to move in a third direction intermediate of the first and second directions.

42. A hand portable device as claimed in any one of claims 37 to 40. further comprising a display for displaying an image having a perspective dependent upon a notional viewing position, wherein the first control signal causes the notional viewing position to move in a first direction, the second control signal causes the notional viewing position to move in a second direction and the third

control signal causes the notional viewing position to move in a third direction intermediate of the first and second directions.

43. A method of providing 8-way directional control using a user input device comprising a first set of sensors consisting of a first sensor adjacent a second sensor, constituting a first pair of sensors, and a third sensor adjacent the second sensor, constituting a second pair of sensors and a second set of sensors, adjacent the first set of sensors, consisting of a fourth sensor adjacent a fifth sensor, constituting a third pair of sensors, and a sixth sensor adjacent the fifth sensor, constituting a fourth pair of sensors, comprising the steps of: actuating predetermined ones of the sensors to move in any one of a first four orthogonal directions, and
actuating predetermined ones of the four pairs of the sensors to move in any one of a second four orthogonal directions, off-set by 45 degrees from the first four orthogonal directions.

It therefore an object of the present invention to provide an improved joystick-like control in a hand portable device using a keypad.

According to one aspect of the present invention there is provided a hand portable device comprising: a user input device comprising a plurality of sensors in an array for tactile actuation by a user; control means responsive to the actuation of a sensor by itself or the simultaneous actuation of a pair of adjacent sensors; wherein the control means produces one of N control signals upon actuation of a sensor by itself or the simultaneous actuation of an adjacent pair of sensors; and wherein each of the N control signals belong to a first set of control signals or a second set of control signals, wherein each sensor of the array is associated with only one of the control signals of the first set and wherein each of the control signals of the second set is associated with an adjacent pair of sensors in the array, but each adjacent pair of sensors is not associated with a control signal of the second set.

According to another aspect of the invention there is provided a method of providing N-way directional control using more than $N/2$ but less than N sensors to provide N different control signals, wherein each of the N different control signals is a member of either a first set of control signals or a second different set of control signals, the method comprising: associating each one of the sensors in the array with only one control signal from the first set; associating each of the control signals of the second set with a pair of sensors without associating each of the pairs of sensors with a control signal of the second set; detecting when a sensor or sensors of the array are actuated; and providing the control signal associated with the detected actuated sensor(s).

According to a third aspect of the present invention there is provided a user input device for providing 8-way directional control, comprising: a first set of sensors consisting of a first sensor adjacent a second sensor, constituting a first pair of sensors, and a third sensor adjacent the second sensor, constituting a second pair of sensors; and a second set of sensors, adjacent the first set of sensors, consisting of a fourth sensor adjacent a fifth sensor, constituting a

2a

third pair of sensors, and a sixth sensor adjacent the fifth sensor, constituting a fourth pair of sensors; wherein user actuation of a respective one of at least four of the six sensors provides for control in a respective one of four different

directions and user actuation of a respective one of the first, second, third and fourth pairs of sensors provides for control in a respective one of the remaining four different directions.

According to a further aspect of the present invention there is provided a method of providing 8-way directional control using a user input device comprising a first set of sensors consisting of a first sensor adjacent a second sensor, constituting a first pair of sensors, and a third sensor adjacent the second sensor, constituting a second pair of sensors and a second set of sensors, adjacent the first set of sensors, consisting of a fourth sensor adjacent a fifth sensor, constituting a third pair of sensors, and a sixth sensor adjacent the fifth sensor, constituting a fourth pair of sensors, comprising the step of: actuating predetermined ones of the sensors to move in any one of a first four orthogonal directions, and actuating predetermined ones of the four pairs of the sensors to move in any one of a second four orthogonal directions, off-set by 45 degrees from the first four orthogonal directions.

Thus embodiments of the present invention provides for the control of the element (for example a cursor or a character in a game) on the screen, for example, by using an existing keypad in a non-standard manner.

For a better understanding of the present invention and to understand how the same may be brought into effect, reference will now be made by way of example only to the accompanying drawings in which:

Fig. 1 is a schematic illustration of a hand portable device;

Fig. 2a illustrates a mobile phone having a conventional 4x3 keypad array for data entry;

Fig. 2b illustrates a mobile phone having a QWERTY keypad for data entry;